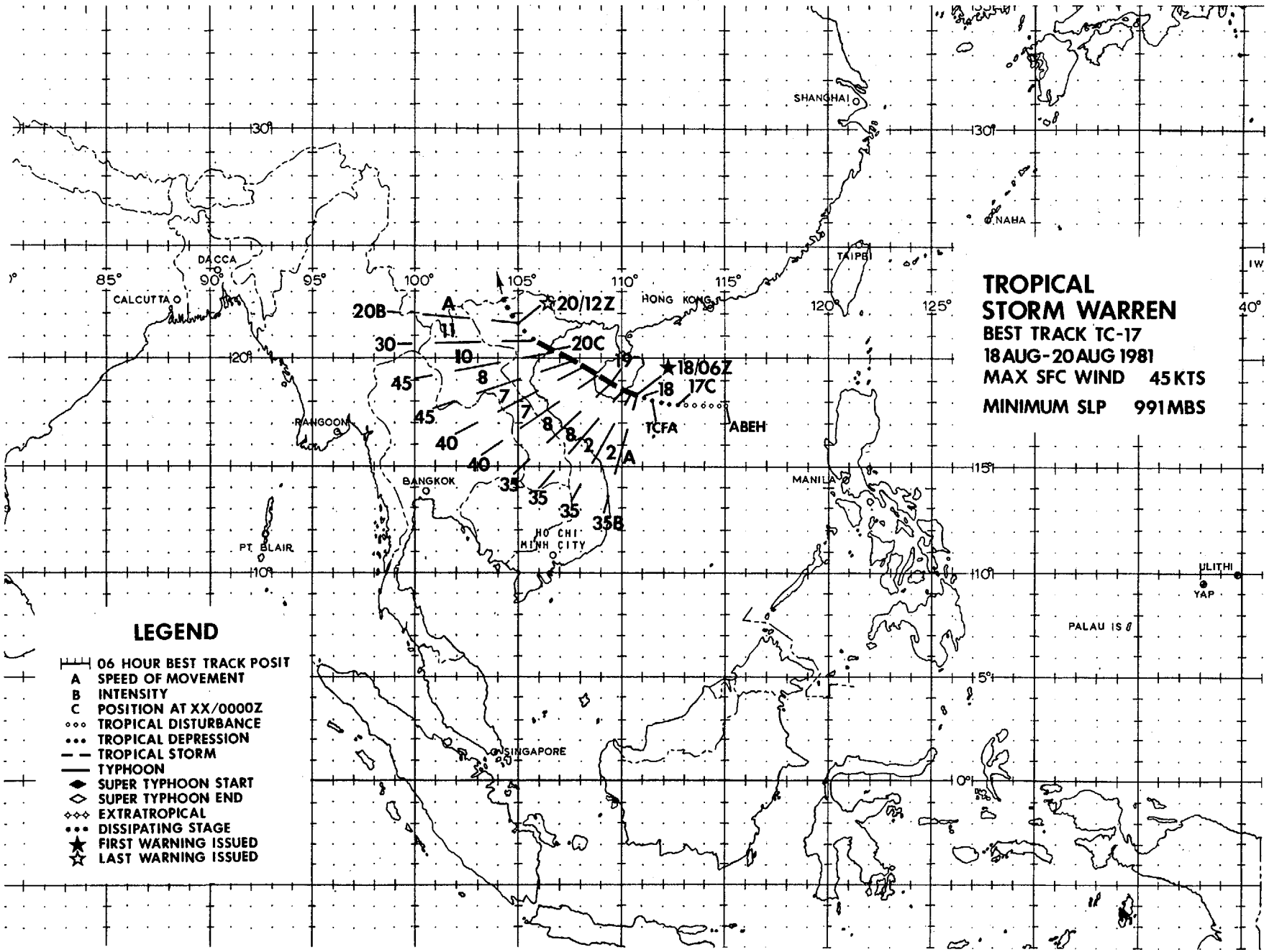
TROPICAL
STORM WARREN
BEST TRACK TC-17
18 AUG - 20 AUG 1981
MAX SFC WIND 45 KTS
MINIMUM SLP 991 MBS
LEGEND
06 HOUR BEST TRACK POSIT
A SPEED OF MOVEMENT
B INTENSITY
C POSITION AT XX/0000Z
TROPICAL DISTURBANCE
TROPICAL DEPRESSION
TROPICAL STORM
TYPHOON
SUPER TYPHOON START
SUPER TYPHOON END
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
20B
A
11
30
10
20/12Z
20C
19
18/06Z
18
17C
45
8
7
7
8
8
2
2
A
45
40
40
35
35
35
35B
TCFA
ABEH
SHANGHAI
NAHA
TAIPEI
HONG KONG
DACCA
CALCUTTA
RANGOON
BANGKOK
PT BLAIR
HO CHI MINH CITY
MANILA
SINGAPORE
ULITHI
YAP
PALAU IS
130°
120°
110°
100°
95°
90°
85°
105°
115°
125°
40°
15°
5°
0°

The disturbance that eventually became Warren developed within a monsoon trough that extended across the South China Sea on the 14th of August. Strong vertical wind shear, caused by northeasterly flow at the 200 mb level, inhibited development of the circulation for the next three days. By the 17th of August the 200 mb wind field weakened, allowing upper level features to develop, surface pressures dropped below 1000 mb, and convective activity south of the disturbance center increased. Consequently a Tropical Cyclone Formation Alert was issued at 171500Z.

The system was initially tracking westward at 05 kt (9 km/hr) under the influence of mid-level easterlies generated by a stationary 500 mb anticyclone positioned over Southeast China. This anticyclone persisted throughout Warren's life cycle and its intensity changes were responsible for the variable speed of movement (between 2 kt (4 km/hr) and 5 kt (9 km/hr)) seen prior to the storm striking Hai-nan Island.

By 180600Z satellite imagery showed that Warren had developed an upper level outflow center and the first tropical storm warning was issued. Most of the convective activity was located south of the surface center as were the maximum surface winds. Synoptic and satellite data also indicated that Warren's vertical axis was tilted southward as he tracked over Hai-nan.

After passing over Hai-nan, Warren emerged into the Gulf of Tonkin. Warren continued to show indications of increased organization and intensification as he tracked over the warm water in the Gulf of Tonkin. At 1800Z on the 19th Warren reached his maximum intensity of 45 kt (23 m/sec) while over the Gulf (Fig. 3-17-1), a typical occurrence for most tropical cyclones that move into the Gulf of Tonkin. During the summer months the gulf water becomes extremely warm and thus provides excellent source of energy for transiting tropical cyclones.

Warren made landfall near Nam Dinh, Vietnam, on the 20th of August and weakened rapidly. The final warning on Warren was issued at 1200Z on the 20th as it began to dissipate over Vietnam.

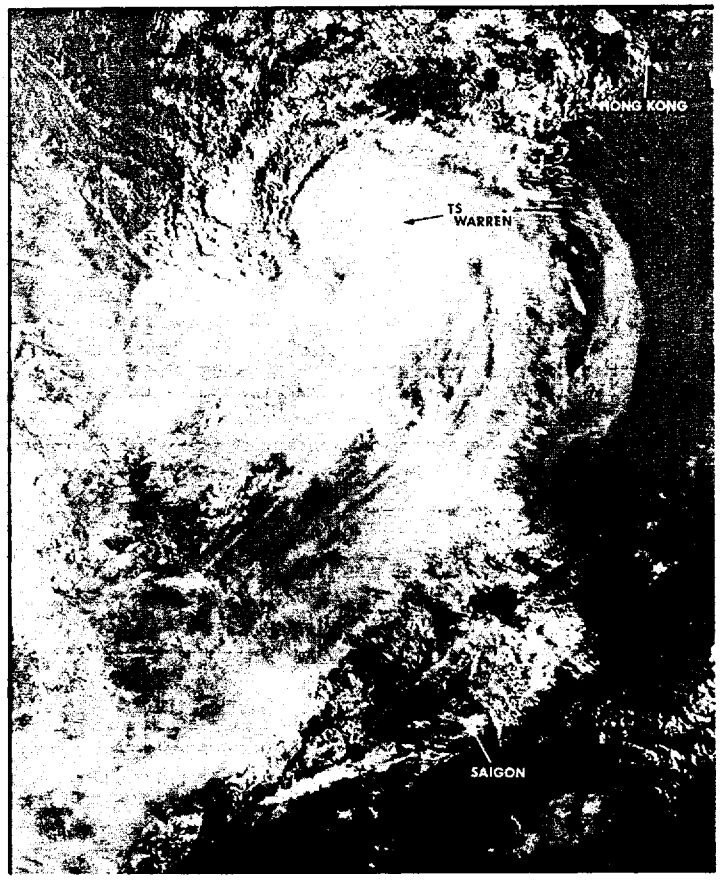

FIGURE 3-17-1. Tropical Storm Warren with maximum surface winds of 45 kt (23 m/sec) prior to landfall of 20 August, 0102Z. (NOAA 6 visual imagery)